The Power of Context

Making Sense of Multiplication and Division

Learning Targets

- Examine and decontextualize multiplication and division problems.
- Explore how connecting context to multiplication and division tools/strategies supports conceptual understanding.
- Make connections to the Common Core Standards (OA and NBT) and the Standards for Mathematical Practice.

Why is context a powerful support for students?

- Allows students to act out or visualize the mathematical situation.
- Student can draw on their prior experience to make sense of the mathematics in the problems.
- It gives meaning to processes, procedures, and algorithms.

Conceptualizing Multiplication

What are the different ways we can conceptualize multiplication?

Multiplication: Context Matters

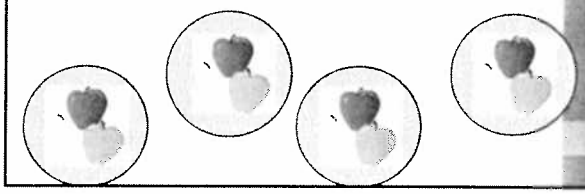
Factor x Factor = Product

Multiplier — How many groups?

Multiplicand — How many in each group?

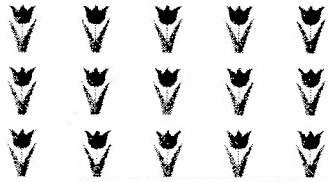
"Seeing" the Multiplier

There are 4 baskets with 3 apples in each basket. How many apples in all?



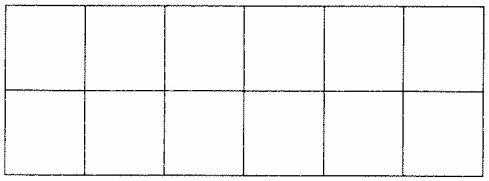
"Seeing" the Multiplier

There are 3 rows of tulips in the garden with 5 tulips in each row. How many tulips are there?



"Seeing" the Multiplier

What is the area of a 2 cm by 6 cm rectangle?



Connecting Context to Multiplication Tools and Strategies

A popsicle stick is 5 inches long. If you put 4 popsicle sticks end to end, what is their total length?

- What is the multiplier?
- What is the multiplicand?
- What equation can you use to represent the problem?
- What tools/strategies would you use to represent this problem?

Connecting Context to Multiplication Tools and Strategies

There are 12 clowns at a parade. Each clown is caring 3 balloons. How many balloons are there all together?

- What is the multiplier?
- What is the multiplicand?
- What equation can you use to represent the problem?
- What tools/strategies would you use to represent this problem?

Connecting Context to Multiplication Tools and Strategies

You are buying blinds for your bedroom window. It measures 3 feet long by 4 feet wide. What is the area of the blinds that will cover your window?

- What is the multiplier?
- What is the multiplicand?
- What equation can you use to represent the problem?
- What tools/strategies would you use to represent this problem?

Connecting Context to Multiplication Tools and Strategies

An ice cream shop sells 16 cones each hour. If the shop is open for 5 hours, what is the total number of ice cream cones that they will sell?

- What is the multiplier?
- What is the multiplicand?
- What equation can you use to represent the problem?
- What tools/strategies would you use to represent this problem?

Connecting Context to Multiplication Tools and Strategies

A lion in captivity eats 21 pounds of meat each day. If the zoo is ordering meat for two weeks, how many pounds should they order for the lion?

- What is the multiplier?
- What is the multiplicand?
- What equation can you use to represent the problem?
- What tools/strategies would you use to represent this problem?

Reflect

- How does putting context to a multiplication equation support conceptual understanding?
- How does connecting a tool/strategy support conceptual understanding of multiplication?
- What standards for mathematical practice did you engage in?

Conceptualizing Division

What are the different ways we can conceptualize division?

Division Word Problem Sort

- Sort the problems into categories
- Use post-its to name your categories
- Be prepared to share your thinking

Two Types of Division

PARTITIVE	MEASUREMENT
How many in each group?	How many groups?
Fair sharing or dealing out.	Repeated subtraction.
Most intuitive and most exposure.	Limited exposure.

Understanding the two types

Multiplication and division problem type table (table 2 in Common Core)	Partitive versus Measurement division contextual chart

Two types of division: Problem Sort

PARTITIVE (How many in each group?)	MEASUREMENT (How many groups?)
Luis	Sun
Keisha	Sandwiches
Michaela	Isabel
Martin	Cupcakes

Representing two types of Division

Anna baked 18 cookies. If she gives 3 cookies to each friend, how many friends can she feed?

Anna baked 18 cookies. If she shares them equally among 3 of her friends, how many cookies does each friend get?

Connecting Context to Division Tools and Strategies

Zane wants to make blueberry pancakes so that there are the same number of blueberries in each pancake. If he has 54 blueberries and he makes 6 pancakes, how many blueberries in each pancake?

- What is the multiplier?
- What is the multiplicand?
- What equation can you use to represent the problem?
- What tools/strategies would you use to represent this problem?

Connecting Context to Division Tools and Strategies

Adan has a collection of 48 marbles. If he puts 8 marbles in a paper cup, how many paper cups will he use?

- What is the multiplier?
- What is the multiplicand?
- What equation can you use to represent the problem?
- What tools/strategies would you use to represent this problem?

Connecting Context to Division Tools and Strategies

Damon has 138 skittles to share equally among 6 friends. How many skittles will each friend get?

- What is the multiplier?
- What is the multiplicand?
- What equation can you use to represent the problem?
- What tools/strategies would you use to represent this problem?

Connecting Context to Division Tools and Strategies

Rachel bakes 156 cookies. If she puts 12 cookies into a baggie, how many baggies can she fill?

- What is the multiplier?
- What is the multiplicand?
- What equation can you use to represent the problem?
- What tools/strategies would you use to represent this problem?

Connecting Context to Division Tools and Strategies

Nana made 340 cupcakes for the party. If each batch makes 16 cupcakes, how many batches did nana make?

- What is the multiplier?
- What is the multiplicand?
- What equation can you use to represent the problem?
- What tools/strategies would you use to represent this problem?

Reflect

- How does putting context to a division equation support conceptual understanding?
- How does connecting a tool/strategy support conceptual understanding of division?
- What standards for mathematical practice did you engage in?

Reviewing Learning Targets

- Examine and decontextualize multiplication and division problems.
- Explore how connecting context to multiplication and division tools/strategies supports conceptual understanding.
- Make connections to the Common Core Standards (OA and NBT) and the Standards for Mathematical Practice.

In closing...

- What questions do you have?
- What are your take aways?

If you have any questions or if you would like to contact me, please feel free to do so!

cruiz@psusd.us

References

NCTM Presentation by Andria Disney

Carpenter, Thomas P., Elizabeth Fenneman, Megan Loef Franke, Linda Levi, and Susan B. Empson, *Children's Mathematics: Cognitively Guided Instruction*, The National Council of Teachers of Mathematics, Inc., 1999, Heinemann: Portsmouth, NH.